

AMENDMENTS TO THE CLAIMS

1. (Currently amended) An ~~proteorhodopsin gene~~ isolated DNA molecule, comprising a
nucleotide sequence encoding a proteorhodopsin protein with at least 78% amino acid
5 identity to Sequence ID No:7, wherein ~~from a naturally occurring marine gamma~~
~~proteobacterium of Sequence ID No:1, said proteorhodopsin gene encoding a~~
proteorhodopsin protein ~~has~~ing a secondary structure of seven transmembrane α -
helices ~~that form a~~ and a retinal binding pocket in which retinal is covalently linked.
- 10 2. (Currently amended) The isolated DNA molecule of claim 1, wherein said DNA
molecule is isolated from a source selected from the group consisting A
~~proteorhodopsin gene retrieved from a genomic fragment of a sample of naturally~~
occurring bacteria, marine proteobacteria, gamma-proteobacteria, SAR86 bacteria,
bacterioplankton extracts, recombinant DNA libraries containing derived from said
15 naturally occurring bacteria, or bacterial artificial chromosome libraries ~~containing~~
derived from said naturally occurring bacteria, ~~said proteorhodopsin gene encoding a~~
~~proteorhodopsin protein having a secondary structure of seven transmembrane α -~~
helices ~~that form a pocket in which retinal is covalently linked.~~
- 20 3. (Cancelled)

4. (Currently amended) The isolated DNA molecule ~~proteorhodopsin gene~~ of claim ~~21~~, wherein said ~~proteorhodopsin gene~~ is nucleotide sequence comprises Sequence ID No:6 and said ~~proteorhodopsin protein~~ is ~~Sequence ID No:7~~.

5 5. (Currently amended) The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 37, wherein said proteorhodopsin-specific primers include three nucleotides encoding a non-native amino acid, creating a new restriction endonuclease site not present in the native sequence of said isolated DNA molecule ~~proteorhodopsin gene~~, thereby allowing subcloning of said isolated DNA molecule ~~proteorhodopsin gene~~ in an expression vector.

6. (Currently amended) The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 41, wherein said bacterium is *E. Coli*.

15 7. (Currently amended) The isolated DNA molecule ~~proteorhodopsin gene~~ of claim ~~12~~, wherein said nucleotide sequence comprises ~~genomic fragment is retrieved from a clone BAC31A8, said~~ ~~proteorhodopsin gene~~ is Sequence ID No:4 and said ~~proteorhodopsin protein~~ is ~~Sequence ID No:5~~.

20 8-36. (Withdrawn)

37. (Currently amended) The isolated DNA molecule ~~proteorhodopsin gene~~ of claim 1 or 2, wherein said DNA molecule is isolated ~~amplified from said genomic fragment by~~ polymerase chain reaction utilizing proteorhodopsin-specific primers.

38. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 37, wherein said proteorhodopsin-specific primers comprise~~are~~ Sequence ID No:2 and Sequence ID No:3.

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39. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 5, wherein said expression vector containing said isolated DNA molecule~~-proteorhodopsin gene~~ expresses said proteorhodopsin protein in a host.

10 40. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 39, wherein said host is an artificial membrane system.

41. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 39, wherein said host is a bacterium.

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42. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 41, wherein said host is a cell membrane preparation of said bacterium.

20 43. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 39, wherein said host is an eukaryote.

44. (Currently amended) The isolated DNA molecule~~-proteorhodopsin gene~~ of claim 43, wherein said host is a cell membrane preparation of said eukaryote.

25 Clams 45-129 (Cancelled).